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A PROMISING REMEDY FOR BLACK MEASLES OF THE VINE

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The name "Black Measles" is one of several given to a disease or a group of diseases of the vine widely distributed in the grape growing districts of California and in the aggregate causing much loss to the growers. Of the other names, "Black Mildew" and "Spanish Measles" are the most common.

The trouble has been known in California for many years and has been variously ascribed to attacks of fungous or other parasitic organisms and to various soil, water and cultural conditions, or to combinations of these factors. Among the causes other than parasites that have been suggested are rising water table, alkali—especially common salt—in the subsoil, lack of soil moisture, and overbearing. Remedies based on these suggestions such as shorter pruning, changes in irrigation and drainage have been tried by grape growers and, while fairly effective in some cases, they have done little or no good in many. Spraying with Bordeaux has been frequently tried, but the results have usually been unsatisfactory.

SYMPTOMS

The most noticeable gross symptoms of this and related vine troubles are shown by the leaves, canes and fruit. The most characteristic symptom of the form or forms known as Black Measles, and that to which the name is due, is a spotting of the berries, usually most noticeable at the time of ripening. The symptoms of the form of Black Measles to which this circular refers are as follows:

Leaves.—The leaves show large, sinuous, dead leaf areas, surrounded by a dark reddish margin in varieties with black fruit, and with a yellowish one in those with white or red fruit. Later the dead areas crack and give the leaves a ragged appearance. (Fig. 1.) The

uppermost leaves are first affected and the disease seems to progress downwards. This symptom accounts for the name "Top disease" used in the Santa Clara Valley.



Fig. 1.—Carignane shoot showing typical dead leaf areas.

Shoots.—Affected shoots dry up partially or entirely. In the former case, the upper part turns brown, while the basal part remains almost normal except for a few reddish lines along the internodes.

Fruit.—In severe cases, the attack appears in early summer and the berries shrivel, turn rapidly from green to reddish brown and finally dry to skin and seed. (Fig. 2.) In milder cases, the attack appears later and the berries show the disease as they commence to ripen. In these cases, the skin, especially of white varieties, shows round, dark spots bordered by a brownish or purplish ring. (Fig. 3.)



Fig. 2.—Petite Sirah shoot almost bare of leaves with dried upper portions of shoots and dried bunches.

OBSERVATIONS AND STUDIES IN NORTHERN CALIFORNIA

The similarity of these symptoms to those of a disease known in France and Algeria as “Apoplexy of the vine” indicates that the two diseases are probably identical. Apoplexy is generally believed in France to be due to the decay of the wood of the trunk caused by the attack of a wood destroying fungus obtaining access to the interior of the vine through large pruning wounds or imperfect graft unions. A spray containing soluble arsenic has been found very effective in controlling Apoplexy in European vineyards.

The trunk in over forty cases which I examined during this investigation showed in the crown or head a mass of varying size of soft, spongy, yellowish, decayed wood. (Figs. 4 and 5.)



Fig. 3.—Diseased Rish Baba bunch showing spotting of berries characteristic of Black Measles.

The similarities suggested the use of a soluble arsenical such as had given excellent results in Europe. Accordingly, in coöperation with several growers and county farm advisors, the following experiments were made.



Fig. 4.—Longitudinal section of a Sultanina trunk showing decayed wood.

SPRAYING EXPERIMENTS

The method of control tested was to spray or swab affected and presumably susceptible vines within a short time after pruning with a spray containing a soluble arsenite.

Trial 1.—This was conducted near Madison in coöperation with W. D. Norton, County Farm Advisor of Yolo County, and W. A. Stites, owner of the vineyard.

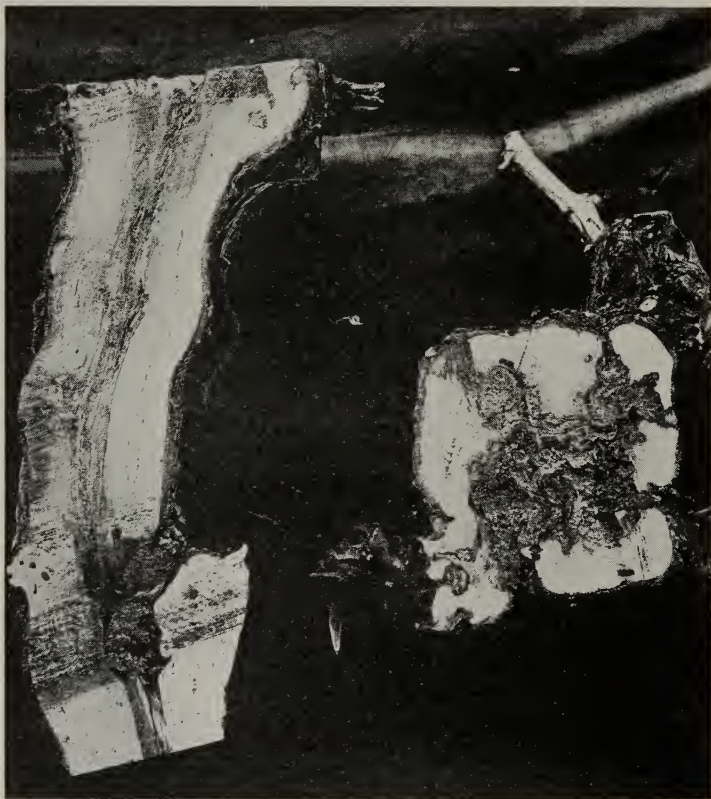


Fig. 5.—Longitudinal and cross section of a grafted vine with imperfect union, showing decay at and above the union.

A square plot of 100 Carignane vines showing about 8 per cent of affected vines was sprayed on January 23, 1924, shortly after pruning, with a spray of 2 pounds sodium arsenite in 50 gallons water. (See formula No. 1, p. 10.) Repeated observations during the following growing season by Mr. Norton and myself failed to reveal any affected vines in the sprayed area, though there were many affected vines just outside the plot.

After the harvest of 1924, several affected vines were marked in the vicinity of the treated plot. On March 2, 1925, the plot was treated again with the same spray, and also the marked vines outside the plot. During the growing season of 1925, no sprayed vines showed any symptoms of the disease though many were found in the unsprayed portion of the vineyard.

The result then of two years' winter spraying in the Madison vineyard was that in a block of 100 sprayed Carignane vines, of which 8 per cent were visibly diseased before spraying, no diseased vine was found during the ensuing two seasons, and that a number of marked isolated diseased vines which were sprayed in 1924 showed no symptoms of disease in 1925.

Trial 2.—This test was made in Vineyard No. 1 at the University Farm at Davis on two rows of Dizmar and one of Muscat. The distribution of the diseased vines and of the spraying is shown by the following diagram.

Row 25 A	Muscat
Row 24	<u>. B D</u>	Dizmar
Row 23 <u>C</u>	Dizmar

In 1924 three of the 48 Dizmar and one of the 24 Muscat vines A, B, C, and D, showed symptoms of Black Measles. Each dot represents a vine and the underlining shows the vines which were treated.

The spray was applied on March 12, 1925, about a month after pruning. It consisted of 3 pounds of sodium arsenite in 50 gallons of water. (See formula 2, p. 10.) During the season of 1925, no new cases of the disease appeared in the three rows and the vines A, B, and C, which had been sprayed, appeared healthy. Vine D, however, which had not been sprayed, showed the same symptoms of disease that it had shown in 1924.

Trial 3.—This test was carried out by C. S. Myszka, County Farm Advisor of Mendocino County, on the vineyard of Fred Waugh near Ukiah. The spray solution used was made by dissolving $2\frac{1}{4}$ pounds of white arsenic and $4\frac{1}{2}$ pounds of washing soda in 50 gallons of water. (See formula, 3, p. 10.) The remedy was applied by thoroughly swabbing the spurs, arms and trunks of a row of 32 Zinfandel vines, on March 12, 1925. A similar adjoining row of 32 vines was used as a check. Eleven diseased vines were found on the untreated row in 1925, but none on the treated.

Trial 4.—This test was also carried out by C. S. Myszka, and the same spray solution used. The vines were Petit Bouschet in the

vineyard of J. Lee Smith in Redwood Valley. The spray was applied by means of a pressure pump. On 60 sprayed vines, no case of the disease occurred, while 3 occurred on 20 vines left untreated for a check.

Trial 5.—Tests were made in coöperation with J. Willis Adriance, County Farm Advisor of San Joaquin County, on Zinfandel vines in the vineyards of E. H. Fink, Jr., of the Bruella Center, and of Charles Knudsen of the Lockport Center. Vines which had been marked as diseased in 1924, some having been marked also in 1923, were treated in March, 1925. A sodium arsenite solution of the same composition (3:50) as that used at Davis (see formula 2, p. 10) was applied to the affected vines by swabbing.

During the growing season, the vines were watched until harvest, but not a single treated vine in either place showed a trace of the disease, while other vines in the same vineyards were affected noticeably.

CONCLUSIONS

These observations and tests indicate strongly that the common form of the "Black Measles" of the vine as this term is generally applied in the Sacramento Valley and the coast region is identical or very closely allied to the disease known as "Apoplexy" in European vineyards, and that it responds to the arsenical spray which is the most approved remedy in France and Algeria for this disease.

Until this remedy has been more generally tested in California, however, it should be used experimentally, especially in regions other than those where these tests were made. In some cases of disease showing symptoms similar to those of Black Measles, the causes may be different but the remedy should be tried. After experiments have shown in any particular vineyard that the remedy is effective, it may profitably be used generally in that vineyard. In making trials, the use of checks is strongly urged. A suitable way of making checks would be to spray alternate rows or blocks of vines in vineyards where the diseased vines are numerous, or to swab marked diseased vines in alternate rows in vineyards where they are much scattered.

METHOD OF TREATMENT

In the above experiments whether the 3-50 formula (No. 2), of 3 pounds of sodium arsenite in 50 gallons of water, or the 2-50 formula (No. 1) was used, no sprayed vine showed any signs of the disease after treatment. Of these two formulae, the stronger should be given the preference as probably more effective. No poisonous effect on the vine was observed to follow the use of either formula. Furthermore, it is possible that the stronger solution will produce more lasting results. This point needs further investigation.

The cost of the spray is small, the arsenic and its soluble compounds not being costly. In small vineyards or where there are very few affected vines, the solution can be applied most economically by swabbing all the pruning wounds, recent or old, especially those on the old wood. In large vineyards or where many vines are affected, the spray method is more economical. It is advisable to delay a few days after pruning before applying the treatment, though in our experiments no ill effects resulted from spraying shortly after pruning.

CAUTIONS

Stronger solutions than those recommended here should not be used, as solutions containing 1.5 per cent of arsenic have been known to injure the vines.

Finally, it must be kept in mind that the spray solution is extremely poisonous to human beings as well as to animals and every precaution must be taken to prevent accidental ingestion of this poison. As a constant reminder to those handling the solution, it is a good precaution to add a little fuchsin to the solution to give it a reddish color. The spray should be applied only during the dormancy of the vines, that is to say between the 15th of December and the end of March for most regions.

FORMULAE OF SOLUTIONS USED

Formula I

Sodium arsenite, 2 pounds; water, 50 gallons.

Formula II

Sodium arsenite, 3 pounds; water, 50 gallons.

When the sodium arsenite is not obtainable at the stores, the 3-50 formula can be replaced by the following:

Formula III

(a) $2\frac{1}{4}$ pounds of white arsenic (arsenic trioxide).

(b) $4\frac{1}{2}$ pounds of washing soda.

Put the arsenic in 1 gallon of water in an iron kettle, heat and pour the washing soda dissolved in about two gallons of water slowly into (a). Boil the mixture for about twenty minutes and make up to 50 gallons of spray with water.

Formula IV

(a) $2\frac{1}{4}$ pounds of white arsenic (arsenic trioxide).

(b) $1\frac{1}{8}$ pounds of soda lye.

Put the arsenic in 1 gallon of water, dissolve the lye in another gallon of water and pour (b) into (a) while stirring, until all the arsenic is dissolved. Make up to 50 gallons of mixture with water. A stock solution can be prepared if it is advisable. Little or no heating is necessary.

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